Remarks/Arguments

As of the Office Action mailed April 8, 2005 claims 1-10 are pending in the application and stand rejected. Reexamination and reconsideration are respectfully requested in light of the amendments and remarks/arguments herein.

Amendments to the Specification

Paragraph 0019 of the specification has been amended to make a clerical correction. Specifically, the paragraph included a statement that there be "sufficient heating of the power." This was amended to recite that there be "sufficient heating of the powder." No new matter has been added.

Amendments To The Claims

Claim 1 has been amended to recite a metallic thermal barrier coating comprising an alloy metal and greater than about 4 atomic % of at least one P-group alloying element, wherein said metal thermal barrier coating has a thermal conductivity equal to or less than about 10 W/m-K at 400 degrees Celsius. Support for this amendment can be found in Table 1 and Table 2 of the published specification. As disclosed therein, the subject 717HV alloy of the present invention may have a thermal conductivity of 10 W/m K at 400 degrees Celsius. In addition, 717 coatings (Table 1) are disclosed to have a thermal conductivity of 5.48 W/m K at 400 degrees Celsius, when in the form of a wire arc coating. Accordingly, claim 1 is believed fully supported when reciting a metallic thermal barrier coating comprising an alloy metal and greater than about 4 atomic % of at least one P-group alloying element, wherein said metal thermal

barrier coating has a thermal conductivity equal to or less than about 10 W/m-K at 400 degrees Celsius.

The Examiner will note that a similar amendment has been proposed to independent claim 6 and 7. For the reasons noted above, no new matter has been entered.

Rejections Under 35 USC §102/103

Claims 1-3, 5-10 have been rejected under 35 USC §102 as being anticipated by Masumoto et al, U.S. Patent Number 3,986,867, Dickson et al, U.S. Patent Number 4,381,943. Furthermore, claims 1-10 have been rejected under 35 USC §102 as being anticipated by Ray, U.S. Patent Numbers 4,067,732; 4,290,808; and 4,523,621, or Bose et al, U.S. Patent Number 4,515,870.

Applicant notes that as amended, claim 1 is directed to a metallic thermal barrier coating comprising an alloy metal and greater than about 4 atomic % of at least one P-group alloying element, wherein said metal thermal barrier coating has a thermal conductivity equal to or less than about 10 W/m-K at 400 degrees Celsius. None of the references cited teach or suggest a metallic **thermal** barrier coating. Nor do the references cited teach or suggest a metallic thermal barrier coating wherein the thermal conductivity is equal to or less than about 10 W/m-K.

Furthermore, as amended claim 6 is directed to a method for producing a metallic **thermal** barrier coating composition comprising supplying a metal alloy composition; and supplying a P-group alloying element; mixing said metal alloy composition and said P-group alloying element wherein said P-group alloying element is present at a level to reduce the thermal/and or electrical conductivity of said metal alloy composition, wherein said metal

thermal barrier coating has a thermal conductivity equal to or less than about 10 W/m-K at 400 degrees Celsius.

Claim 7, as amended, is directed to a method for producing a metallic **thermal** barrier coating composition comprising: supplying a base metal with a free electron density, supplying a P-group alloying element, and combining said P-group alloying element with said base metal and decreasing the free electron density of the base metal, wherein said metal alloy has a thermal conductivity equal to or less than about 10 W/m-K at 400 degrees Celsius. It is submitted that the cited references fail to teach or suggest metallic thermal barrier coatings having thermal conductivities equal to or less than about 10 W/m-K at 400 degrees Celsius.

Applicant notes that none of the cited patents referenced discuss or mention the effect of lowering the thermal conductivity of a metal to what may be found in a ceramic, i.e. equal to or less than about 10W/m-K at 400 degrees Celsius. For example, many of the cited references talk about optimizing corrosion resistance, or mechanical properties such as tensile strength or ductility. However, the references are devoid of any indication that the effect of lowering the thermal conductivity of the metal alloys of the presently claimed invention might reach the levels recited in the pending claims, or that such thermal conductivity for a metal thermal barrier coating was known, anticipated or utilized in any fashion.

Applicant notes what appears to be a suggestion by the Examiner that with respect to Masumoto, that since Masumoto suggests that carbon, boron and phosphorous may be added to a Fe-Cr alloy in the amounts with the claimed range, such would inherently reduce thermal and/or electrical conductivity. Applicant responds as follows:

With reference to the present specification, the SHS717 powder material is disclosed to be an alloy composition of Fe (52.3), Cr (19.0), Mo (2.5), W (1.7), B (16.0), C (4.0), Si (2.5) and Mn (2.0). SHS717 wire is disclosed to be Fe (55.9), Cr (22.0), Mo (0.6), W (0.4), B (15.6), C (3.5), Si (1.2) and Mn (0.9). Now, turning to Masumoto, as disclosed in the Abstract, the compositions are said to be 1-40 atomic % chromium, and 7-35 atomic % of at least one of carbon, boron and phosphorous, the remainder being iron. By implication, the iron may fall between levels of 25-92 %. Then, the reference states that "a part of the content of iron" may be substituted with one other element from the list of nickel, cobalt, molybdenum, zirconium, titanium, manganese, vanadium, niobium, tungsten, tantalum and copper. It is not clear what is meant by the term "a part of the content of iron" other than what may be provided in the working examples, which, e.g., suggests that molybdenum may be present at "less than 20 atomic percent." See, column 2, lines 23-24.

Masumoto's very general disclosure of such compositions then proceeds to disclose absolutely nothing about the thermal conductivity performance of the various alloys, such as a thermal conductivity equal to or less than about 10 W/m-K at 400 degrees Celsius. While granted, there is passing reference to "heat resistance", the focus of the reference is on the goal of improved mechanical properties, and in particular corrosion resistance. In that context, it is believed difficult to conclude that Masumoto provided guidance or inherently identified the particular alloy composition of, e.g. SHS717, and its associated thermal conductivity performance that is now recited in the amended claims.

From a legal perspective, inherency of a disclosure can only be established under those circumstances where it can fairly be established that the feature of a pending claim is necessarily

present in the specification of the reference so that one skilled in the art would recognize such a disclosure. *Tronzo v. Biomet, Inc.* 47 USPQ2d 1829 (Fed. Cir. 1998). In the present case it is considered reasonable to conclude that Masumoto failed to teach or suggest, and did not inherently disclose, the alloys and thermal conductivity performance recited in the claims as amended herein. In fact, as the Examiner may appreciate, given the relative broad disclosure of a range of iron between 25-92%, and the fact that the exemplary SHS717 alloy (which realizes and supports the claimed thermal conductivity performance), contains eight (8) different elements at different levels, it would take extraordinary amount of experimentation for one skilled in the art, following Masumoto, to arrive at SHS717 (if at all) with the expectation of a thermal conductivity of equal to or less than about 10 W/m-K at 400 degrees Celsius.

Expanding on the above, conventionally, metals may generally be considered good conductors of electricity due to the presence of free electrons and ceramics may generally be considered poor conductors due to electron transfer and the formation of ionic bonds. It is not known that the thermal conductivity of metals can be lowered to equal to or less than about 10 W/m-K at 400 degrees Celsius and there is nothing in the cited references that indicates otherwise.

The comments above are considered to apply equally to the other rejections of the claim under 35 USC 102(b) and/or 103 in view of Dickson et al (4,381,943); Ray (4,067,732, 4,290,808, 4,523,621) or Bose et al (4,515,870).

For example Dickson et al discloses a metal powder of deposing on a substrate that is based in Fe, Ni, Co or a combination thereof. Similar to Masumoto, there is no teaching of the thermal conductivity as recited in the amended claims, and such feature would not necessarily be

present in this reference. For example, Dickson et al discloses 5 – 30 atomic percent boron incorporated with Ni, Fe, and/or Co and/or Si, C, P, Al, Ge, Mo, W, Mn, V, Cr, Cu and/or Ti. The fact that the exemplary SHS717 alloy contains eight (8) different elements at different levels (with B at the specific level of 15-16 atomic percent), which alloy exhibits and supports the claimed thermal conductivity performance, it would take extraordinary amount of experimentation for one skilled in the art, following the broad disclosure of Dickson, to arrive at SHS717 (if at all) with the expectation of a thermal conductivity of equal to or less than about 10 W/m-K at 400 degrees Celsius.

Turning to Ray '621, such reference stands directed at a metallic glass powder wherein the formula is said to be sourced from U.S. Patent No. 3,856,513, which is said to disclose an alloy that contains iron, nickel, cobalt, chromium and vanadium. Once again, the fact that the exemplary SHS717 alloy contains eight (8) different elements at different levels (with B at the specific level of 15-16 atomic percent), which alloy exhibits and supports the claimed thermal conductivity performance, it would take extraordinary amount of experimentation for one skilled in the art, following Ray, to arrive at SHS717 (if at all) with the expectation of a thermal conductivity of equal to or less than about 10 W/m-K at 400 degrees Celsius. This same distinction regarding the deficiencies of Ray '621 also applies to Ray '808 (see column 4, lines 68 to col. 5, line 12 wherein Ray '621 again points to U.S. 3,856,513) and to Ray '732 (see column 3, lines 25-43 where broad and general disclosure of metallic percents are provided, none of which teach or suggest, e.g., a thermal conductivity of equal to or less than about 10 W/m-K at 400 degrees Celsius. Similarly, the U.S. '870 patent to Bose again provides only broad teachings

to various alloys, none of which teach or suggest, e.g., a thermal conductivity of equal to or less than about 10 W/m-K at 400 degrees Celsius.

In light of the above, Applicant respectfully submits that claims 1-10 and their depending claims are not taught or suggested by the cited references. In consideration of the foregoing Applicant respectfully requests that the rejections of claims 1-10 are withdrawn upon reconsideration of the amendments and remarks herein.

Having overcome all of the outstanding rejections, it is respectfully submitted that the application is now in condition for allowance. Early and favorable action is respectfully solicited.

In the event that there are any fee deficiencies, or additional fees are payable, please charge, or credit any overpayment to, our Deposit Account No. 50-2121.

Respectfully submitted,

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